Medical Care

In both children and adults, the first step in the treatment of protein-energy malnutrition (PEM) is to correct fluid and electrolyte abnormalities and to treat any infections. The most common electrolyte abnormalities are hypokalemia, hypocalcemia, hypophosphatemia, and hypomagnesemia. Macronutrient repletion should be commenced within 48 hours under the supervision of nutrition specialists.

A 1980 double-blind study of 8 children with kwashiorkor and skin ulceration found that topical zinc paste was more effective than placebo in healing areas of skin breakdown. Oral zinc supplements were also found to be effective.

The second step in the treatment of protein-energy malnutrition (which may be delayed 24-48 h in children) is to supply macronutrients by dietary therapy. Milk-based formulas are the treatment of choice. At the beginning of dietary treatment, patients should be fed ad libitum. After 1 week, intake rates should approach 175 kcal/kg and 4 g/kg of protein for children and 60 kcal/kg and 2 g/kg of protein for adults. A daily multivitamin should also be added.

For most of the cutaneous manifestations of inflammatory bowel disease, the primary therapy remains treatment of the bowel.

In one study, patients who were undergoing chemotherapy for advanced hepatic cancer who received a late-evening snack enhanced with branched-chain amino acids had improvements in energy metabolism parameters compared with controls.[13]

Chung et al,[17] in discussing that protein-energy malnutrition is highly prevalent among peritoneal dialysis patients, noted that although nutritional status assessments are better now than they were a decade ago, no definitive single test is available to assess nutritional status. Instead, they propose that several different markers of nutrition must be used to understand nutritional status. Thus, the treatment for peritoneal dialysis patients with malnutrition must be multifaceted, and they suggest using nontraditional strategies such as appetite stimulants, anti-inflammatory diets, and anti-inflammatory pharmacologic agents combined with more traditional forms of nutritional support to abate the protein-energy malnutrition.

The clinical guideline summary, Dietary guidelines for Americans, 2005, from the US Department of Health and Human Services and US Department of Agriculture, may be helpful.[18]

Consultations

Any patient at risk for nutritional deficiency should be referred to a registered dietitian or other nutritional professional for a complete nutritional assessment and dietary counseling.

Other subspecialty referrals should be considered if findings from the initial evaluation indicate that the underlying cause is not poor nutritional intake. If signs indicate malabsorption, a gastroenterologist should be consulted. Further, in pediatric cases, a pediatrician, preferably one with experience in the management of protein-energy malnutrition (PEM), should oversee care of the patient. Any patient with significant laboratory abnormalities, as discussed above, may benefit from consultation with the appropriate subspecialty (eg, endocrinology, hematology).

Children with poor nutrition secondary to inadequate intake and/or neglect should be referred to the appropriate social agencies to assist the family in obtaining resources and providing ongoing care for the child.

Protein-energy malnutrition: an integral approach and a simple new classification.
M A Gassull, E Cabré, L Vilar, A Alastrue, A Montserrat

A new approach to the classification of protein-energy malnutrition (PEM) in adults is proposed. Three widely accepted measurements, triceps skinfold (TSF), mid-arm muscle circumference (MAMC) and serum albumin (SA) were evaluated simultaneously as representative of the three main body nutritional compartments, that is, fat, muscle protein and visceral protein, respectively. These measurements were carried out in a group of 1709 healthy controls (1038 men and 671 women) living a normal life in the geographical area served by our hospital, in order to define the standard values (50th percentile) of the chosen variables for different age and sex groups. The lower limits of normal values were obtained by calculating the 5th percentile for each age and sex group and were expressed as the percentage of the 50th percentile. Once the standards and lower limits of normality were established, the chosen variables were incorporated into a tridimensional Cartesian system, the origin of the three axes (point 0) being the lower limits of normality (5th percentile). Each axis was then divided into positive (optimal) and negative (suboptimal) zones. This provided eight theoretical possibilities of protein-energy nutritional status. In order to define completely the nutritional status in a particular individual, the degree of severity for each variable should be added (mild, moderate and severe). This quantification can be represented with a point in the corresponding nutritional space. This classification was used to assess the nutritional status in 135 consecutive GI hospital in-patients (82 men and 53 women, mean age 48.23 years) at the time of admission, and in a group of 50 consecutive GI out-patients (28 men and 22 women, mean age 47.98 years) when seen for the first time at a NHS Gastroenterology Clinic. Only 32 per cent of the GI in-patients fulfilled the criteria of being well-nourished. The prevalence of PEM in this group was 68 per cent, the predominant types being mixed and kwashiokor-like (35 and 24 per cent, respectively). The prevalence of PEM in the GI out-patient group was 18 per cent, with a total absence of mixed types. Statistical analysis was performed between nutritional measurements among the three groups studied, as well as for the prevalence of PEM in different diseases among in-patients. This series was compared with other reported series, using the same nutritional variables but a different approach.(ABSTRACT TRUNCATED AT 400 WORDS)

Protein-Energy Malnutrition

Definition

Protein-energy malnutrition (PEM) is a potentially fatal body-depletion disorder. It is the leading cause of death in children in developing countries.

Description

PEM is also referred to as protein-calorie malnutrition. It develops in children and adults whose consumption of protein and energy (measured by calories) is insufficient to satisfy the body's nutritional needs. While pure protein deficiency can occur when a person's diet provides enough energy but lacks the protein minimum, in most cases the deficiency will be dual. PEM may also occur in persons who are unable to absorb vital nutrients or convert them to energy essential for healthy tissue formation and organ function.
Although PEM is not prevalent among the general population of the United States, it is often seen in elderly people who live in nursing homes and in children whose parents are poor. PEM occurs in one of every two surgical patients and in 48% of all other hospital patients.

Types of pem

Primary PEM results from a diet that lacks sufficient sources of protein and/or energy. Secondary PEM is more common in the United States, where it usually occurs as a complication of AIDS, cancer, chronic kidney failure, inflammatory bowel disease, and other illnesses that impair the body's ability to absorb or use nutrients or to compensate for nutrient losses. PEM can develop gradually in a patient who has a chronic illness or experiences chronic semi-starvation. It may appear suddenly in a patient who has an acute illness.

Kwashiorkor

Kwashiorkor, also called wet protein-energy malnutrition, is a form of PEM characterized primarily by protein deficiency. This condition usually appears at the age of about 12 months when breastfeeding is discontinued, but it can develop at any time during a child's formative years. It causes fluid retention (edema); dry, peeling skin; and hair discoloration.

Marasmus

Primarily caused by energy deficiency, marasmus is characterized by stunted growth and wasting of muscle and tissue. Marasmus usually develops between the ages of six months and one year in children who have been weaned from breast milk or who suffer from weakening conditions like chronic diarrhea.

Causes and symptoms

Secondary PEM symptoms range from mild to severe, and can alter the form or function of almost every organ in the body. The type and intensity of symptoms depend on the patient's prior nutritional status and on the nature of the underlying disease and the speed at which it is progressing.

Mild, moderate, and severe classifications have not been precisely defined, but patients who lose 10-20% of their body weight without trying are usually said to have moderate PEM. This condition is also characterized by a weakened grip and inability to perform high-energy tasks. Losing 20% of body weight or more is generally classified as severe PEM. People with this condition can't eat normal-sized meals. They have slow heart rates and low blood pressure and body temperatures. Other symptoms of severe secondary PEM include baggy, wrinkled skin; constipation; dry, thin, brittle hair; lethargy; pressure sores and other skin lesions.

Kwashiorkor

People who have kwashiorkor often have extremely thin arms and legs, but liver enlargement and ascites (abnormal accumulation of fluid) can distend the abdomen and disguise weight loss. Hair may turn red or yellow. Anemia, diarrhea, and fluid and electrolyte disorders are common. The body's immune system is often weakened, behavioral development is slow, and mental retardation may occur. Children may grow to normal height but are abnormally thin.
Kwashiorkor-like secondary PEM usually develops in patients who have been severely burned, suffered trauma, or had sepsis (tissue-destroying infection) or another life-threatening illness. The condition's onset is so sudden that body fat and muscle mass of normal-weight people may not change. Some obese patients even gain weight.

Marasmus

Profound weakness accompanies severe marasmus. Since the body breaks down its own tissue to use as calories, people with this condition lose all their body fat and muscle strength, and acquire a skeletal appearance most noticeable in the hands and in the temporal muscle in front of and above each ear. Children with marasmus are small for their age. Since their immune systems are weakened, they suffer from frequent infections. Other symptoms include loss of appetite, diarrhea, skin that is dry and baggy, sparse hair that is dull brown or reddish yellow, mental retardation, behavioral retardation, low body temperature (hypothermia), and slow pulse and breathing rates.
The absence of edema distinguishes marasmuslike secondary PEM, a gradual wasting process that begins with weight loss and progresses to mild, moderate, or severe malnutrition (cachexia). It is usually associated with cancer, chronic obstructive pulmonary disease (COPD), or another chronic disease that is inactive or progressing very slowly.
Some individuals have both kwashiorkor and marasmus at the same time. This most often occurs when a person who has a chronic, inactive condition develops symptoms of an acute illness.

Hospitalized patients

Difficulty chewing, swallowing, and digesting food, pain, nausea, and lack of appetite are among the most common reasons that many hospital patients don't consume enough nutrients. Nutrient loss can be accelerated by bleeding, diarrhea, abnormally high sugar levels (glycosuria), kidney disease, malabsorption disorders, and other factors. Fever, infection, surgery, and benign or malignant tumors increase the amount of nutrients hospitalized patients need. So do trauma, burns, and some medications.

Diagnosis

A thorough physical examination and a health history that probes eating habits and weight changes, focuses on body-fat composition and muscle strength, and assesses gastrointestinal symptoms, underlying illness, and nutritional status is often as accurate as blood tests and urinalyses used to detect and document abnormalities.
Some doctors further quantify a patient's nutritional status by:

- comparing height and weight to standardized norms
- calculating body mass index (BMI)
- measuring skinfold thickness or the circumference of the upper arm

Treatment

Treatment is designed to provide adequate nutrition, restore normal body composition, and cure the condition that caused the deficiency. Tube feeding or intravenous feeding is used to supply nutrients to patients who can't or won't eat protein-rich foods.
In patients with severe PEM, the first stage of treatment consists of correcting fluid and electrolyte imbalances, treating infection with antibiotics that don't affect protein synthesis, and addressing related medical problems. The second phase involves replenishing essential nutrients slowly to prevent taxing the patient's weakened system with more food than it can handle. Physical therapy may be beneficial to patients whose muscles have deteriorated significantly.

Prognosis

Most people can lose up to 10% of their body weight without side effects, but losing more than 40% is almost always fatal. Death usually results from heart failure, an electrolyte imbalance, or low body temperature. Patients with certain symptoms, including semiconsciousness, persistent diarrhea, jaundice, and low blood sodium levels, have a poorer prognosis than other patients. Recovery from marasmus usually takes longer than recovery from kwashiorkor. The long-term effects of childhood malnutrition are uncertain. Some children recover completely, while others may have a variety of lifelong impairments, including an inability to properly absorb nutrients in the intestines and mental retardation. The outcome appears to be related to the length and severity of the malnutrition, as well as to the age of the child when the malnutrition occurred.

Prevention

Breastfeeding a baby for at least six months is considered the best way to prevent early-childhood malnutrition. Preventing malnutrition in developing countries is a complicated and challenging problem. Providing food directly during famine can help in the short-term, but more long-term solutions are needed, including agricultural development, public health programs (especially programs that monitor growth and development, as well as programs that provide nutritional information and supplements), and improved food distribution systems. Programs that distribute infant formula and discourage breastfeeding should be discontinued, except in areas where many mothers are infected with HIV.

Every patient being admitted to a hospital should be screened for the presence of illnesses and conditions that could lead to PEM. The nutritional status of patients at higher-than-average risk should be more thoroughly assessed and periodically reevaluated during extended hospital stays or nursing home residence.

Resources

Organizations

American College of Nutrition. 722 Robert E. Lee Drive, Wilmington, NC 20412-0927. (919) 152-1222.
American Institute of Nutrition. 9650 Rockville Pike, Bethesda, MD 20814-3990. (301) 530-7050.
Food and Nutrition Information Center. 10301 Baltimore Boulevard, Room 304, Beltsville, MD 20705-2351. http://www.nalusda.gov/fnic.